

WHAT IS CLAIMED IS:

1. A polymeric membrane produced by the method comprising:
reacting a pre-polymer having a plurality of crosslinkable moieties, and
5 a polyfunctional crosslinking agent, whereby
the crosslinkable moieties are crosslinked with the polyfunctional crosslinking agent.
2. A polymeric membrane according to claim 1, wherein the membrane is a hydrogel.
- 10 3. A polymeric membrane according to claim 1, wherein the pre-polymer is formed from a homopolymer or a copolymer.
4. A polymeric membrane according to claim 3 wherein the pre-polymer is substantially
15 devoid of charge.
5. A polymeric membrane according to claim 4, wherein the pre-polymer is hydrophilic and is water soluble.
- 20 6. A polymeric membrane according to claim 5, wherein the crosslinkable moieties of the pre-polymer are hydroxy groups.
7. A polymeric membrane according to claim 1, wherein the pre-polymer has a molecular weight range of about 10,000 to 200,000.
- 25 8. A polymeric membrane according to claim 7, wherein the pre-polymer has a molecular weight range of about 20,000 to 30,000.

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9. A polymeric membrane according to claim 1, wherein the pre-polymer is a synthetic polymer formed by chain growth polymerization, condensation polymerization, or by both chain growth polymerization and condensation polymerization.

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10. A polymeric membrane according to claim 9, wherein the synthetic pre-polymer is selected from the group consisting of poly(vinyl alcohol), partially esterified poly(vinyl alcohols), copolymers of poly(vinyl alcohols), polymers of hydroxyethylmethacrylate and hydroxyethylacrylate, and polymers of glycidylacrylate and glycidylmethacrylate.

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11. A polymeric membrane according to claim 10, wherein the pre-polymer is poly(vinyl alcohol).

12. A polymeric membrane according to claim 1, wherein the pre-polymer is a natural polymer.

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13. A polymeric membrane according to claim 12, wherein the natural pre-polymer is selected from the group consisting of starch, dextrans, cellulose derivatives, agarose, modified agaroses, and other polysaccharides.

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14. A polymeric membrane according to claim 1, wherein the polyfunctional crosslinking agent contains at least 2 functional groups that are capable of undergoing reaction with the crosslinkable moieties of the pre-polymer to form covalent bonds.

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15. A polymeric membrane according to claim 1, wherein the polyfunctional crosslinking agent is substantially uncharged and does not give rise to a significant degree of charged groups via side reactions.
- 5 16. A polymeric membrane according to claim 1, wherein the polyfunctional crosslinking agent is hydrophilic.
17. A polymeric membrane according to claim 1, wherein the polyfunctional crosslinking agent is selected from the group consisting of dialdehydes, di-isocyanates, diacids, 10 water soluble epoxides, diesters, diacid halides, free or etherified *N*-methylol ureas or *N*-Methylol melamines, dihalogen compounds, epichlorhydrin, dianhydrides, dicarboxylic acids, citric acid, olefinic dialdehydes, phthalaldehyde, 1,3-dichloroacetone, and 1,3-dichloroisopropanol.
- 15 18. A polymeric membrane according to claim 17, wherein the polyfunctional crosslinking agent is a dialdehyde.
19. A polymeric membrane according to claim 18, wherein the polyfunctional crosslinking agent is selected from the group consisting of glutaraldehyde, 2- 20 hydroxyhexanedial-1,6, malonic dialdehyde, succinic dialdehyde, and hexanedial-1,6.
20. A polymeric membrane according to claim 19, wherein the polyfunctional crosslinking agent is glutaraldehyde.
- 25 21. A polymeric membrane according to claim 1, wherein the membrane is formed by crosslinking a poly(vinyl alcohol) with glutaraldehyde.

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22. A polymeric membrane according to claim 1, wherein the pre-polymer is crosslinked at levels of about 1 to 20% w/w polyfunctional crosslinking agent/polymer chain.

23. A polymeric membrane according to claim 1 comprising an aldehyde type polyfunctional crosslinking agent in the polymeric membrane wherein the aldehyde type polyfunctional crosslinking agent in the polymeric membrane has a percentage weight range between about 1% and 20% w/w.

24. A polymeric membrane according to claim 23, wherein the percentage weight range of the aldehyde type polyfunctional crosslinking agent in the polymeric membrane is between about 4 and 15% w/w.

25. A polymeric membrane according to claim 24, wherein the percentage weight range of the aldehyde type polyfunctional crosslinking agent in the polymeric membrane is between about 4.5 and 9.2% w/w.

26. A polymeric membrane according to claim 1, further comprising a divinyl sulfone type polyfunctional crosslinking agent in the polymeric membrane wherein percentage weight range of the divinyl sulfone type polyfunctional crosslinking agent in the polymeric membrane is between about 20% and 60% w/w.

27. A polymeric membrane according to claim 26, wherein the percentage weight range of the divinyl sulfone type polyfunctional crosslinking agent in the polymeric membrane is between about 40 and 50% w/w.

28. A polymeric membrane according to claim 27, wherein the percentage weight range of the divinyl sulfone type polyfunctional crosslinking agent in the polymeric membrane is about 45% w/w.
- 5 29. A polymeric membrane according to claim 1, further comprising a divinyl sulfone type polyfunctional crosslinking agent in the polymeric membrane wherein percentage weight range of the divinyl sulfone type polyfunctional crosslinking agent in the polymeric membrane is between about 45 and 50% w/w.
- 10 30. A polymeric membrane according to claim 1, further comprising a glycidyl ether epoxide type polyfunctional crosslinking agent in the polymeric membrane wherein percentage weight range of a glycidyl ether epoxide type polyfunctional crosslinking agent in the polymeric membrane is between about 500 and 1500% w/w.
- 15 31. A polymeric membrane according to claim 1, wherein percentage of pre-polymer in the membrane is in the range of about 5 to 40% w/w.
32. A polymeric membrane according to claim 31 wherein the percentage of pre-polymer in the membrane is in the range of about 10 to 20% w/w.
- 20 33. A polymeric membrane according to claim 1, wherein the membrane is supported by a substrate.
34. A polymeric membrane according to claim 33 wherein the substrate is a woven material, a non-woven material, or a textile.
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35. A polymeric membrane according to claim 33, wherein the substrate is in the form of a sheet or web.
36. A polymeric membrane according to claim 33, wherein the polymeric membrane is a
5 layer formed on a surface of the substrate, or the substrate is incorporated within the polymeric membrane.
37. A polymeric membrane according to claim 33, wherein the substrate is formed from a material selected from the group consisting of polyvinyl alcohol,
10 polyethyleneteraphthalate, nylon and fibreglass, cellulose, and cellulose derivatives.
38. A polymeric membrane according to claim 37, wherein the substrate is heat bonded polyethyleneteraphthalate, optionally pre-treated with a non-ionic surfactant.
- 15 39. A polymeric membrane according to claim 33, wherein the substrate has hydrophilic characteristics.
40. A polymeric membrane according to claim 39, wherein the substrate is polyvinyl alcohol paper.
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41. A polymeric membrane according to claim 1, wherein the crosslinkable moieties are treated with a coordinating agent.
42. A polymeric membrane according to claim 41, wherein the coordinating agent is in
25 the form of a buffer.

43. A polymeric membrane according to claim 41, wherein the coordinating agent is borate.

44. A method for forming a polymeric membrane, comprising the steps of:

- 5 providing a pre-polymer having a plurality of crosslinkable moieties; and
 contacting the pre-polymer with a polyfunctional crosslinking agent;
 wherein the crosslinkable moieties are crosslinked with the polyfunctional
 crosslinking agent.

10 45. A method for separating molecules comprising the steps of:

- providing a polymeric membrane formed by reacting a pre-polymer having
 crosslinkable moieties with a polyfunctional crosslinking agent, wherein the crosslinkable
 moieties are crosslinked with the polyfunctional crosslinking agent; and
 subjecting the polymeric membrane and a sample to a separation technique so as to
15 separate the molecules.

46. A method according to claim 45, wherein the molecules to be separated are a charged species, or a species capable of bearing a charge.

20 47. A method according to claim 46, wherein the molecule is a bio-molecule.

48. A method according to claim 47, wherein the bio-molecule is selected from the group consisting of protein, peptide, DNA and RNA.

25 49. A method according to claim 45, wherein the separation technique is an electrophoretic technique.

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50. A method according to claim 49, wherein the electrophoretic technique allows for the separation of molecules on the basis of size, charge, or both size and charge.
51. A method according to claim 45, wherein sample contains a protein and a borate in
5 solution is used to concentrate the protein sample.
52. A cartridge suitable for use in an electrophoretic device, the cartridge incorporating a polymeric membrane in accordance with claim 1.
- 10 53. An electrophoresis device comprising at least one polymeric membrane in accordance with claim 1 disposed between two membranes.

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